

REMARKS

I. General

The issues outstanding in the instant application are as follows:

- Claims 8, 10, 19, 21, 31 and 33 are objected to;
- Claims 13-15, 17, 18 and 20 stand rejected under 35 U.S.C. 102(b) as anticipated by Tzu, U.S. Pat. No. 6,093,507 (hereinafter TZU);
- Claims 1-4, 6, 7 and 9 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of Kurihara et al., U.S. Pat. No. 6,200,711 (hereinafter KURIHARA);
- Claim 5 stands rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and further in view of Rolson, U.S. Pat. No. 6,057,065 (hereinafter ROLSON);
- Claims 8 and 10-12 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and further in view of Rolfson, U.S. Pat. No. 5,376,483 (hereinafter ROLFSON);
- Claim 16 stands rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of ROLSON;
- Claims 19 and 21-23 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of ROLFSON;
- Claims 24-27, 29, 30, 32, 36-54 and 59-69 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and further in view of Laming et al., U.S. Pat. No. 6,459,705 (hereinafter LAMING);
- Claim 28 stands rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and LAMING and further in view of ROLSON; and

- Claims 31, 33-35 and 55-58 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and LAMING further in view of ROLFSON.

Applicants hereby traverse the outstanding rejections of the claims, and request reconsideration and withdrawal of the outstanding rejections in light of the amendments and remarks contained herein. Claims 1 through 69 are currently pending in this application.

II. Objections to the Claims

Claims 8, 10, 19, 21, 31 and 33 are objected to as lacking antecedent basis for the claim limitation "the shifted pixel." Claims 8, 10, 19, 21, 31 and 33 are amended above to correct these typographical errors by replacing the word "shifted" with the word "extra" or the word "missing" as appropriate. The claims have been amended only for cosmetic purposes, resolving minor informalities resulting from typographical errors, and not for a substantial reason related to patentability. No new matter has been added by these amendments.

III. Rejection under 35 U.S.C. §102(b)

Claims 13-15, 17, 18 and 20 are rejected under 35 U.S.C. §102(b) as being anticipated by TZU. Applicant respectfully traverses this rejection.

The recited reference does not teach all claimed limitations.

It is well settled that to anticipate a claim, the reference must teach every element of the claim, see M.P.E.P. §2131. Moreover, in order for a prior art reference to be anticipatory under 35 U.S.C. § 102 with respect to a claim, "[t]he elements must be arranged as required by the claim," see M.P.E.P. § 2131, citing *In re Bond*, 15 US.P.Q.2d 1566 (Fed. Cir. 1990). Furthermore, in order for a prior art reference to be anticipatory under 35 U.S.C. § 102 with respect to a claim, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim," see M.P.E.P. § 2131, citing *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913 (Fed. Cir. 1989). Applicant respectfully asserts that the rejection does not satisfy at least these requirements.

Claim 13 defines "at least one bar includes at least one predetermined irregularity on at least one edge." Contrary to the contentions of the Office Action TZU does not disclose these limitations. TZU discloses a method of forming phase shifting type masks using a single resist layer with two exposure doses. The core of TZU's invention provides a method of forming phase shifting masks, which requires only one resist application which can be exposed by a single electron beam using different exposure doses. Figures 1 to 9 of TZU are cross-sections of a mask, and Figure 9 in particular shows a cross-section of a mask after the remaining part of the layer of resist has been stripped and the mask has been completed. Thus, the "irregularities" (23 and 25) cited by the Office Action as shown by TZU (Figure 9) can be compared to phase steps, which are created on the top of the bars of the TZU mask and which locally vary the thickness of the mask. As explained in columns 3 and 4:

"When the mask is used to transfer the mask pattern to a layer of resist formed on an integrated circuit wafer, the light passing through the second pattern region 25 of the mask passes through an extra first thickness 27 of the transparent mask substrate 20, as compared to the light passing through the first pattern region 23 of the mask. This extra first thickness 27 of the transparent mask substrate 20 provides a 180° phase shift compared to the light which does not pass through the extra first thickness 27 of the transparent mask substrate 20."

In contrast, the present invention is directed to systems and methods for producing masks without stitching errors from re-scaling or repositioning. Inserting phase steps as disclosed in TZU and providing irregularities as recited in the present claims are completely different. For example, referring to FIGURES 2 and 4 of the present application, which are face views of an embodiment of the inventive mask, the irregularities or shifted pixels (204, 205, 206, 208) are not the same as the phase steps proposed by TZU. The irregularities of the present invention are positioned on an edge of the bars (201, 202, 203) as recited in the present independent claims, including claim 13. In contrast the phase steps (23, 25) of TZU are variations in depth or thickness as pointed out by the portion of TZU recited above. In the present invention, irregularities on at least one edge of the bars are used to fabricate an FBG having a much finer resolution than those fabricated with conventional masks. As explained in the summary of the present invention, the invention preferably "feathers" the pixels of the mask lines by adding, removing, and/or displacing one or more pixels.

Thus, TZU does not teach the claimed "at least one bar includes at least one predetermined irregularity on at least one edge." Therefore, Applicant respectfully asserts that for the above reasons independent claim 13 is patentable over the 35 U.S.C. §102 rejection of record. Furthermore, there are great differences between claim 13 and the prior art of record, and a person of ordinary skill in the art considering the prior art would not find these differences obvious.

Claims 14, 15, 17, 18 and 20 ultimately depend from base independent claim 13, and thus inherit all limitations of claim 13. Therefore, each of claims 14, 15, 17, 18 and 20 set forth features and limitations not recited by TZU. Thus, Applicant respectfully asserts that for the reasons cited above in answer to the rejection of claim 13, claims 14, 15, 17, 18 and 20 are patentable over the 35 U.S.C. §102 rejection of record.

IV. Rejections under 35 U.S.C. §103(a)

As noted above, claims 1-4, 6, 7 and 9 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA. Claim 5 stands rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and further in view of ROLSON. Claims 8 and 10-12 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and further in view of ROLFSON. Claim 16 stands rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of ROLSON. Claims 19 and 21-23 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of ROLFSON. Claims 24-27, 29, 30, 32, 36-54 and 59-69 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and further in view of LAMING. Claim 28 stands rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and LAMING and further in view of ROLSON. Finally, claims 31, 33-35 and 55-58 stand rejected under 35 U.S.C. §103(a) as unpatentable over TZU in view of KURIHARA and LAMING further in view of ROLFSON. However, since each of these obviousness rejections are based on TZU, it is believed that all the claims on file are new and inventive, and consequently, the Examiner is respectfully requested to withdraw his rejections for the reasons advanced below.

A Prima Facie case of obviousness has not been established.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art cited must teach or suggest all the claim limitations. See M.P.E.P. §2143. Without conceding the second criteria, Applicant asserts that the rejection does not satisfy the first and third criteria.

A. The recited combination does not teach or suggest all claimed limitations.

The Office Action admits that TZU does not teach various elements found in claims 1-12, 16, 19 and 21-69. The Office Action attempts to cure these deficiencies by introducing various references and combinations of references including KURIHARA, ROLSON, ROLFSON and LAMING, which the Office Action alleges to teach singularly or in combination as having the elements absent from TZU. However, these combinations, as presented, do not teach or suggest all limitations of the claimed invention.

Base independent claims 1, 13, 24 and 53 all define limitations such as "least one predetermined irregularity on at least one edge." As pointed out above in addressing the anticipation rejection of claim 13 above TZU does not disclose these limitations. KURIHARA, ROLSON, ROLFSON or LAMING are not relied on by the Office Action in the various combinations presented as disclosing these limitations. Therefore, the various combinations of references do not teach all elements of the claimed invention.

Claims 2-12, 16, 19, 21-23, 25-52 and 54-69 ultimately depend from base independent claims 1, 13, 24 and 53, respectively, and thus inherit all limitations of their respective base claims. Therefore, each of claims 2-12, 16, 19, 21-23, 25-52 and 54-69 set forth features and limitations not recited by the various combinations of TZU, KURIHARA, ROLSON, ROLFSON and LAMING. Thus, Applicant respectfully asserts that for the reasons advanced above in answering the anticipation rejection of claim 13 and the obviousness rejections of claims 1, 24 and 53, claims 2-12, 16, 19, 21-23, 25-52 and 54-69 are patentable over the 35 U.S.C. § 103(a) rejections of record.

B. The Office Action does not provide the requisite motivation.

The Office Action admits that TZU does not teach various elements found in claims 1-12,16, 19 and 21-69. The Office Action attempts to cure this deficiency by introducing various references and combinations of references including KURIHARA, ROLSON, ROLFSON and LAMING, which the Office Action alleges to teach having such elements absent from TZU. The stated motivation for making many of the combinations depend on:

“... such a modification would vary the thickness of the mask...”

It is well settled that the fact that references can be combined or modified is not sufficient to establish a prima facie case of obviousness, M.P.E.P. §2143.01. Such language as presented above does not state any desirability for making the modification, whereas, as pointed out above TZU addresses “thickness...of the transparent mask substrate” and the present invention deals with irregularities along bar edges. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ.2d 1430 (Fed. Cir. 1990), as cited in M.P.E.P. §2143.01. Further, it is advanced that given the above irreconcilable intents of TZU and the present application the Examiner is relying on impermissible hindsight to formulate the present obviousness rejections, particularly given the number of references required to meet claims 28, 31, 33-35 and 55-58. Thus, the motivation provided by the Examiner is improper, as the motivation must establish the desirability for making the modification. No valid suggestion has been made as to why the various combinations based on TZU are desirable. Therefore, the rejection of claim 1-12,16, 19 and 21-69 should be withdrawn.

V. Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. According, the Examiner is respectfully requested to pass this application to issue.

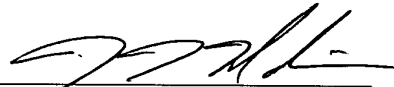
As pointed out above, a Petition for Extension of Time and the requisite fee for a one-month extension of time accompany this Amendment. Applicant believes no further fee is due with this response. However, if a fee is due, please charge Deposit Account No. 06-2380, under Order No. 64626/P007US/10303011 from which the undersigned is authorized to draw.

The Examiner is respectfully encouraged to contact the below listed attorney if he can be of any assistance in expediting prosecution of this Application.

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Respectfully submitted,

By



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